

# Electrician

Levels:	Grades 10-12
Units of Credit:	1.0
CIP Codes:	46.0302
Prerequisite:	None

## CORE STANDARDS, OBJECTIVES, AND INDICATORS

**STANDARD**      **Students will be able to understand electrical safety**  
**460302-01**

### **OBJECTIVES**

460302-01 <u>01</u>	Demonstrate safe working procedures in a construction environment.
460302-01 <u>02</u>	Explain the purpose of OSHA and how it promotes safety on the job.
460302-01 <u>03</u>	Identify electrical hazards and how to avoid or minimize them in the workplace.
460302-01 <u>04</u>	Explain safety issues concerning lockout/tagout procedures, personal protection using assured grounding and isolation programs, confirm space entry and fall protection systems.

**STANDARD**      **Students will be able to understand hand bending**  
**460302-02**

### **OBJECTIVES**

460302-02 <u>01</u>	Identify the methods of hand bending conduit.
460302-02 <u>02</u>	Identify the various methods used to install conduit.
460302-02 <u>03</u>	Use math formulas to determine conduit bends.
460302-02 <u>04</u>	Mark 90° bends, back-to-back bends, offsets, kicks, and saddle bends using a hand bender.

**STANDARD**      **Students will be able to understand fasteners and anchors**  
**460302-03**

### **OBJECTIVES**

460302-03 <u>01</u>	Identify and explain the use of anchors
460302-03 <u>02</u>	Demonstrate the correct applications for fasteners and anchors

**STANDARD  
460302-04**

**Students will be able to understand electrical theory I**

**OBJECTIVES**

- 460302-0401 Recognize what atoms are and how they are constructed.  
460302-0402 Define voltage and identify the ways in which it can be produced.  
460302-0403 Explain the difference between conductors and insulators.  
460302-0404 Define the units of measurement that are used to measure the properties of electricity.  
460302-0405 Explain how voltage, current, and resistance are related to each other.  
460302-0406 Using the formula for Ohm's Law, calculate an unknown value.  
460302-0407 Explain the different types of meters used to measure voltage, current, and resistance.  
460302-0408 Using the power formula, calculate the amount of power used by a circuit.

**STANDARD  
460302-05**

**Students will be able to understand electrical theory II**

**OBJECTIVES**

- 460302-0501 Explain the basic characteristics of a series circuit.  
460302-0502 Explain the basic characteristics of a parallel circuit.  
460302-0503 Explain the basic characteristics of a series-parallel circuit.  
460302-0504 Calculate, using Kirchoff's Current Law, the total current in parallel and series-parallel circuits.  
460302-0505 Find the total amount of resistance in a series circuit.  
460302-0506 Find the total amount of resistance in a parallel circuit.  
460302-0507 Find the total amount of resistance in a series-parallel circuit.

**STANDARD  
460302-06**

**Students will be able to understand electrical test equipment**

**OBJECTIVES**

- 460302-0601 Explain the operation of and describe the following pieces of test equipment:
- Ammeter
  - Ohmmeter
  - Continuity tester
  - Voltmeter
  - Volt-ohm-milliammeter (VOM)
  - Voltage tester
- 460302-0602 Explain how to read and convert from one scale to another using the above test equipment
- 460302-0603 Explain the importance of proper meter polarity
- 460302-0604 Explain the difference between digital and analog meters.

**STANDARD  
460302-07**

**Students will be able to understand Introduction to the National Electrical Code**

**OBJECTIVES**

- 460302-0701 Explain the purpose and history of the National Electrical Code (NEC).
- 460302-0702 Describe the layout of the NEC.
- 460302-0703 Explain how to navigate the NEC.
- 460302-0704 Describe the purpose of the National Electrical Manufacturers' Association (NEMA) and the National Fire Protection Association (NFPA).
- 460302-0705 Explain the role of testing laboratories.

**STANDARD  
460302-08**

**Students will be able to understand raceways, boxes and fittings**

**OBJECTIVES**

- 460302-0801 Describe various types of cable trays and raceways.
- 460302-0802 Identify and select various types of sizes and raceways.
- 460302-0803 Identify and select various types of raceway fittings.
- 460302-0804 Identify various methods used to install raceways.
- 460302-0805 Demonstrate knowledge of NEC raceway requirements.
- 460302-0806 Describe procedures for installing raceways and boxes on masonry surfaces.
- 460302-0807 Describe procedures for installing raceways and boxes on concrete surfaces.
- 460302-0808 Describe procedures for installing raceways and boxes in a wood frame environment.
- 460302-0809 Describe procedures for installing raceways and boxes on drywall surfaces.
- 460302-0810 Recognize safety precautions that must be followed when working with boxes and raceways.

**STANDARD  
460302-09**

**Students will be able to understand conductors**

**OBJECTIVES**

- 460302-0901 Explain the various sizes and gauges of wire in accordance with American Wire Gauge standards.
- 460302-0902 Identify insulation and jacket types according to conditions and applications.
- 460302-0903 Describe voltage ratings of conductors and cables.
- 460302-0904 Read and identify markings on conductors and cables.
- 460302-0905 Use the tables in the NEC to determine the ampacity of a conductor.
- 460302-0906 State the purpose of stranded wire.
- 460302-0907 Describe the different materials from which conductors are made.
- 460302-0908 Describe the different types of conductor insulation.

460302-0909	Describe the color coding of insulation.
460302-0910	Describe the equipment required for pulling wire through conduit.
460302-0911	Describe the procedure for pulling wire through conduit.
460302-0912	Install conductors in conduit.
460302-0913	Pull conductors in a conduit system.

**STANDARD 460302-10 Student will be able to understand boxes and fittings.**

### **OBJECTIVES**

460302-1001	Describe the different types of nonmetallic and metallic boxes.
460302-1002	Understand the NEC requirements for box fill.
460302-1003	Calculate the required box size for any number and size of conductors.
460302-1004	Explain the NEC regulations for volume required per conductor in outlet boxes.
460302-1005	Properly locate, install, and support boxes of all types.
460302-1006	Understand the NEC requirements for boxes supporting lighting fixtures.
460302-1007	Install the different types of fittings used in conjunction with boxes.
460302-1008	Explain how boxes and fittings are selected and installed.
460302-1009	Describe the various types of box supports.

### **PROFESSIONAL DEVELOPMENT**

**STANDARD 460201-11 The student will understand the need for professional development.**

### **OBJECTIVES**

460201-1101	Complete a personal inventory
460201-1102	Set and meet goals
460201-1103	Motivate yourself
460201-1104	Decision making
460201-1105	Manage time
460201-1106	Organize personal belongings and lab equipment
460201-1107	Communicate verbally
460201-1108	Write effective communications
460201-1109	Establish a personal reading program
460201-1110	Develop effective work skills and attitudes
460201-1111*	Master a working knowledge of SkillsUSA <ul style="list-style-type: none"> <li>▪ state the SkillsUSA motto</li> <li>▪ state the SkillsUSA creed</li> <li>▪ learn the SkillsUSA colors</li> <li>▪ describe the official SkillsUSA dress</li> <li>▪ describe the procedure for becoming a SkillsUSA officer</li> </ul>

**STANDARD The student will understand the need for leadership skills.**

## **460201-12**

### **OBJECTIVES**

- 460201-1201 Serve on a committee
- 460201-1202 Prepare an agenda
- 460201-1203 Assist in planning a meeting
- 460201-1204 Review basic parliamentary procedure
  - Make a main motion
- 460201-1205 Participate in a school project
- 460201-1206 Attend a community meeting
- 460201-1207 Practice effective speaking
- 460201-1208 Present a 3-5 minute talk
- 460201-1209 Implement a leadership project
- 460201-1210\* Master a working knowledge of SkillsUSA
  - Describe the meaning of the SkillsUSA emblem
  - State the SkillsUSA pledge
  - Describe the duties of a SkillsUSA officer

### **STANDARD 460201-13**

**The student will understand the need for career planning.**

### **OBJECTIVES**

- 460201-1301 Define your future occupation
- 460201-1302 Survey employment opportunities
- 460201-1303 Report on a trade journal article
- 460201-1304 Explore opportunities for advanced training
- 460201-1305 Conduct a worker interview
- 460201-1306 Contact a professional association
- 460201-1307 Explore entrepreneurship opportunities
- 460201-1308 Give a talk about your career
- 460201-1309 Review career goals

### **STANDARD 460201-14**

**The student will understand the need for employment skills.**

### **OBJECTIVES**

- 460201-1401 Develop a list of work standards to follow at school and on the job.
- 460201-1402 Evaluate your personal ethics
  - Evaluate your personal ethics against acceptable workplace ethics
- 460201-1403 Build a job search network
- 460201-1404 Find job leads
- 460201-1405 Write a resume

- 460201-1406 Create a job portfolio
- 460201-1407 Complete a job application
- 460201-1408 Write a business letter and memo
- 460201-1409 Participate in an actual or simulated job interview

\*SkillsUSA PDP requirements - optional but recommended